What is claimed is:

1. A receiving method for a dual-mode receiver, the method characterized in that:

when a received communication signal is a wideband signal, the dual-mode receiver is configured as a direct-conversion receiver; and

when a received communication signal is a narrowband signal, the dual-mode receiver is configured as a low-IF receiver.

2. The method of claim 1, wherein receipt of a communication signal by a direct-conversion mode further comprises:

receiving an input signal with a carrier;

amplifying the input signal;

converting the amplified signal down to baseband signals, wherein the baseband signals comprise an I-channel signal and a Q-channel signal;

canceling DC offsets of the I-channel signal and the Q-channel signal; and

filtering and amplifying the signals without DC offsets to generate a pair of signals output.

3. The method of claim 1, wherein receipt of a communication signal by a low-IF mode organized further comprises:

receiving an input signal with a carrier;

amplifying the input signal;

converting the amplified signal down to intermediate frequency signals, wherein the intermediate

frequency signals comprise an I-channel signal and a Q-channel signal;

canceling DC offsets and image of the I-channel signal and the Q-channel signal;

filtering and amplifying the signals without DC offsets and image to generate a pair of signals; and

converting the pair of signals down to baseband signals output, wherein the baseband signals comprise a second I-channel signal and a second Q-channel signal.

4. A dual-mode receiver, comprising:

an antenna for receiving an input signal with a carrier from a transmitting channel;

a low noise amplifier coupled to the antenna, for amplifying the input signal;

a quadrature mixer coupled to the low noise amplifier, for receiving an amplified signal and two local oscillator signals respectively with a first phase and a second phase, wherein when the dual-mode receiver operates in a direct-conversion mode, the quadrature mixer converts the amplified signal down to a pair of first baseband signals and when the dual-mode receiver operates in a low-IF mode, the quadrature mixer converts the amplified signal down to a pair of second intermediate frequency signals with the carrier whose frequency is a first frequency;

a pair of dual-mode filters coupled to the mixer, wherein when the dual-mode receiver operates in the direct-conversion mode, the dual-modes filters are a pair of low pass filters and when the dual-mode receiver operates in the low-IF mode, the dual-modes filters are a pair of poly-phase filters;

a pair of programmable gain amplifiers respectively coupled to the dual-mode filters, wherein when the dual-mode receiver operates in the direct-conversion mode, the programmable gain amplifiers receive first baseband signals to generate a pair of first signals output and when the dual-mode receiver operates in the low-IF mode, the programmable gain amplifiers receive the second intermediate frequency signal signals to generate a pair of second signals output;

a secondary downconverter, wherein when the dual-mode receiver operates in the low-IF mode, the secondary downconverter receives the second signals and a second local oscillator signal, and converts the second signals to a pair of third baseband signals output; and

a pair of switching elements for connecting the programmable gain amplifiers to the secondary downconverter when the dual-mode receiver operates in the low-IF mode.

5. The dual-mode receiver of claim 4, wherein the dual-mode receiver further comprises:

a local oscillator for generating a local oscillator signal with the first phase, a local oscillator signal with the second phase and a second local oscillator signal;

a digital signal processor, wherein when the dual-mode receiver operates in the direct-conversion mode, the digital signal processor receives the first signals to generate data information output and when the dual-mode receiver operates in the low-IF mode, the digital signal processor receives the third signals to generate data information output; and

a pair of switching elements for connecting the programmable gain amplifiers to the digital signal processor when the dual-mode receiver operates in the direct-conversion mode.

6. The dual-mode receiver of claim 4, wherein the first phase and the second phase are respectively 90° and 0°.

7. The dual-mode receiver of claim 4, wherein the secondary downconverter is implemented with an analog circuit.

8. The dual-mode receiver of claim 7, further comprising an analog-to-digital converter coupled after the secondary downconverter.

9. The dual-mode receiver of claim 4, wherein the secondary downconverter is implemented with a digital circuit.

10. The dual-mode receiver of claim 9, further comprising an analog-to-digital converter coupled between the secondary downconverter and the programmable gain amplifiers.

11. A dual-mode receiver, comprising:

an antenna for receiving an input signal with a carrier from a transmitting channel;

a low noise amplifier coupled to the antenna, for amplifying the input signal;

a quadrature mixer coupled to the low noise amplifier, for receiving an amplified signal and two local oscillator signals respectively with a first phase and a second phase, wherein when the dual-mode receiver operates in a direct-conversion mode, the quadrature mixer converts the amplified signal down to a pair of first baseband signals and when the dual-mode receiver operates in a low-IF mode, the quadrature mixer converts the amplified signal down to a pair of second intermediate frequency signals with the carrier whose frequency is a first frequency;

a pair of low pass filters coupled to the mixer, wherein when the dual-mode receiver operates in the direct-conversion mode, the low pass

filters receive the first baseband signals and when the dual-mode receiver operates in the low-IF mode, the low pass filters receive the second intermediate frequency signals;

a pair of programmable gain amplifiers respectively coupled to the dual-mode filters, wherein when the dual-mode receiver operates in the direct-conversion mode, the programmable gain amplifiers receive first baseband signals to generate a pair of first signals output and when the dual-mode receiver operates in the low-IF mode, the programmable gain amplifiers receive the second intermediate frequency signal signals to generate a pair of second signals output;

a quadrature secondary downconverter, wherein when the dual-mode receiver operates in the low-IF mode, the secondary downconverter receives the second signals and two second local oscillator signals respectively in the first phase and the second phase, and converts the second signals to a pair of third baseband signals output; and

a pair of switching elements for connecting the programmable gain amplifiers to the quadrature secondary downconverter when the dual-mode receiver operates in the low-IF mode.

12. The dual-mode receiver of claim 11, wherein the dual-mode receiver further comprises:

a local oscillator for generating the local oscillator signal with the first phase, the local oscillator signal with the second phase, the second local oscillator signal with the first phase and the second local oscillator signal with the second phase;

a digital signal processor, wherein when the dual-mode receiver operates in the direct-conversion mode, the digital signal processor receives the first signals to generate data information output and when the dual-mode receiver operates in the low-IF mode, the digital signal processor receives the third signals to generate data information output; and

a pair of switching elements for connecting the programmable gain amplifiers to the digital signal processor when the dual-mode receiver operates in the direct-conversion mode.

13. The dual-mode receiver of claim 11, wherein the first phase and the second phase are respectively 90° and 0°.

14. The dual-mode receiver of claim 11, wherein the quadrature secondary downconverter is implemented with an analog circuit.

15. The dual-mode receiver of claim 14, further comprising an analog-to-digital converter coupled after the quadrature secondary downconverter.

16. The dual-mode receiver of claim 11, wherein the quadrature secondary downconverter is implemented with a digital circuit.

17. The dual-mode receiver of claim 16, further comprising an analog-to-digital converter coupled between the quadrature secondary downconverter and the programmable gain amplifiers.